IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of

Applicant(s) : Richard J. Mitro et al
Serial No. : 10/824,195
Filed : April 14, 2004
Title : **TUNABLE CUTTING DEVICE**
Docket : GAT 0087 PA/40304.173
Confirm. No. : 5883
Art Unit : 3724

EFS Web Electronic Submission
November 10, 2006

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

AMENDMENT

This paper is being filed in response to the Office Action of August 10, 2006. Reconsideration of the present application is respectfully requested in light of the amendments and remarks below, which include, in order of appearance, beginning on separate sheets:

- Amendments to the Claims; and
- Remarks.

Amendments to the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the present application:

1-6. (Canceled)

7. (Withdrawn - Currently Amended) A tunable cutting device as claimed in claim ~~2~~ 40 wherein said oscillation frequency control is configured to permit variation of said oscillation frequency from about 18 kHz to about 1000 kHz.

8. (Currently Amended) A tunable cutting device as claimed in claim ~~2~~ 40 wherein said oscillation frequency control is configured to permit variation of said oscillation frequency from about 20 kHz to about 41 kHz.

9. (Withdrawn - Currently Amended) A tunable cutting device as claimed in claim ~~2~~ 40 wherein said oscillation frequency control is configured to permit variation of said oscillation frequency over a range of at least about 20 kHz.

10. (Currently Amended) A tunable cutting device as claimed in claim ~~2~~ 40 wherein said oscillation frequency control is configured to permit variation of said oscillation frequency at increments of less than about 0.2 kHz.

11-18. (Canceled)

19. (Currently Amended) A tunable cutting device as claimed in claim ~~2~~ 40 wherein said oscillation frequency control comprises a voltage controlled oscillator.

20. (Original) A tunable cutting device as claimed in claim 19 wherein an output of said voltage controlled oscillator is coupled to said drive unit.

21. (Original) A tunable cutting device as claimed in claim 19 wherein said voltage controlled oscillator comprises electronic circuitry comprising a control voltage input section, a voltage controlled oscillator stage, and a power driver section.

22. (Canceled)

24. (Currently Amended) A tunable cutting device as claimed in claim ~~1~~ 40 wherein said cutting tool mount is configured to permit removal and replacement of said cutting tool.

25-28. (Canceled)

29. (Currently Amended) A tunable cutting device as claimed in claim ~~1~~ 40 wherein said drive unit comprises a piezoelectric drive unit.

30. (Withdrawn - Currently Amended) A tunable cutting device as claimed in claim ~~1~~ 40 wherein said drive unit is configured to oscillate said cutting tool along said cutting axis at about 26 kHz.

31. (Currently Amended) A tunable cutting device as claimed in claim ~~1~~ 40 wherein said object support platform defines an object support plane and said cutting axis is oriented substantially perpendicular to said object support plane.

32-39. (Canceled)

40. (New) A tunable cutting device comprising an object support platform, a cutting tool mount, a cutting tool, a drive unit, a manual oscillation frequency control, and a cutting depth indicator, wherein:

said object support platform defines an object position;

said cutting tool is secured to said cutting tool mount and defines a resonant frequency;

said drive unit is configured to oscillate said cutting tool along a cutting axis intersecting said object position;

said oscillation frequency control is configured to permit variation of an oscillation frequency of said drive unit as said cutting tool oscillates along said cutting axis;

said cutting depth indicator is configured to indicate a position of said cutting tool along said cutting axis and a cutting rate at which said cutting tool moves along said cutting axis during a cutting operation;

said oscillation frequency control is configured to permit simultaneous observation of said cutting rate indicated by said cutting depth indicator and manual variation of said oscillation frequency across a frequency range through manual control of a potentiometer that is accessible via an externally mounted frequency control;

said oscillation frequency control is further configured to permit said manual variation of said oscillation frequency as a function of a cutting rate indicated by said cutting depth indicator and an audible signal generated from contact of said cutting tool with an object in said object position; and

said resonant frequency of said cutting tool falls within said frequency range of said oscillation frequency control.

REMARKS

Claims 7-10, 19-21, 24, 29-31, and 40 are pending in the present application. Claims 7, 9, and 30 have been withdrawn from consideration. By the present amendment, claims 7-10, 19, 24, and 29-31 have been amended, claims 1-6, 11-18, 22, 25-28, and 32-39 have been canceled, and new claim 40 has been introduced.

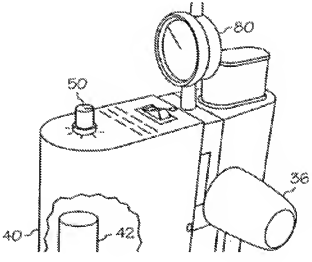
Claim 40 is the only independent claim and recites a tunable cutting device where the oscillation frequency control is configured to permit simultaneous (i) observation of the cutting rate indicated by the cutting depth indicator and (ii) manual variation of the oscillation frequency of the cutting device. The cutting device is configured such that the oscillation frequency can be varied across a frequency range that is broad enough to include the resonant frequency of the cutting tool. In addition, the oscillation frequency can be varied through manual control of a potentiometer that is accessible via an externally mounted frequency control.

Initially, applicants note that the Office Action of August 10, 2006 states that "it is not understood how the frequency control can be configured to permit variation of the oscillation frequency across a frequency range including the resonant frequency of the cutting tool." Claim 40 recites that the "resonant frequency of said cutting tool falls within said frequency range of said oscillation frequency control." Applicant's submit that this language is consistent with the teachings of the specification and corresponds to the clear scenario where the cutting device is designed such that the resonant frequency of the cutting tool falls within the frequency range established by the oscillation frequency control. Specifically, page 4, lines 22-25 of the present application read as follows:

> According to one aspect of the present invention, the oscillation frequency control is configured to permit variation of the oscillation frequency across a frequency range including the resonant frequency of the cutting tool 32. In this manner, the effectiveness of the cutting operation may be optimized.

Accordingly, applicants submit that the corresponding recitation in claim 40 should not be subject to a rejection under 35 U.S.C. §112(1).

Applicants also note that the Office Action includes the assertion that an externally accessible potentiometer is not shown in the drawings and, as such, should not be recited in the claims. The recitations in claim 40 that call out the potentiometer as one "that is accessible via an externally mounted frequency control" have been presented so as to clearly correspond to the description of the potentiometer in the original specification and the illustration of the potentiometer in the original drawings. Specifically, page 3, lines 18-20, of the specification state that "the oscillation frequency is varied manually by controlling the position of a potentiometer 72 (see Fig. 3) that is accessible via the externally mounted frequency control 50." Fig. 1 of the present application clearly shows the external nature of the frequency control 50:



Accordingly, applicant submits that the present drawings show the "externally mounted frequency control" and need not be corrected.

Turning to the references cited in the Office Action, applicants respectfully submit that none of the references relied upon in support of the rejections under 35 U.S.C. §103, either taken alone or in combination, teach or suggest the subject matter recited in independent claim 40. Specifically, the Office Action acknowledges that Takabayashi does not teach an "oscillation frequency control permitting variation of the oscillation frequency, where the cutting rate can be observed by both audible and visual signals (see page 5 of the Office Action)." Noting this deficiency, the Office Action asserts that Devine teaches that it is known to use audible and

visual observations to help set oscillation frequency in a cutting tool. However, Devine does not teach or suggest that the oscillation frequency can be varied manually by controlling the position of a potentiometer that is accessible via an externally mounted frequency control. Further, Devine fails to teach or suggest that the oscillation frequency should be varied across a frequency range that is broad enough to include the resonant frequency of the cutting tool. Devine also fails to suggest that the visual indication of cutting rate be taken from a cutting rate indicated by a cutting depth indicator. Each of these recitations are present in independent claim 40 and none of the remaining references cited in the Office Action teach or suggest these recitations.

Baba has been cited in the Office Action as a reference that teaches that "an ultrasonic cutter can provide accurate width and depth of the cutting tool." However, a close review of the Baba reference reveals that the teachings therein actually relate to the control of cutting depth as opposed to an observation of cutting depth that would facilitate variation of oscillation frequency through manual control of a potentiometer that is accessible via an externally mounted frequency control. The teachings in the Baba reference fall far short of suggesting that a visual indication of cutting rate can be taken from a cutting rate indicated by a cutting depth indicator and used to control cutting frequency.

In the discussion of the relevance of Baba, the Office Action also notes that standard CNC machines include interfaces that show cutting rate but this assertion also falls short of suggesting that cutting rate be taken from a cutting depth indicator and used to control cutting frequency. Applicants respectfully submit that any further reliance on the alleged components of standard CNC machines in rejecting the claims of the present application would necessitate the citation of actual references describing the components of standard CNC machines.

Accordingly, applicants respectfully submit that the prior art of record fails to teach or suggest all of the recitations of independent claim 40 and, as such, cannot be used to establish grounds for rejecting the claims of the present invention under 35 U.S.C. §§ 102 or 103. Each of the remaining pending claims depend from claim 40. Accordingly, applicants respectfully submit that the present application is in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the

application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,

DINSMORE & SHOHL L.L.P.

/ James E. Beyer /

By _____
James E. Beyer, Esq.
Registration No. 39,564

One Dayton Centre
One South Main Street, Suite 1300
Dayton, Ohio 45402-2023
Telephone: (937) 449-6400
Facsimile: (937) 449-6405
e-mail: james.beyer@dinslaw.com